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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/684,502 | 10/15/2003 | Tomoyo Yamaguchi | 244071US2 | 4605 |

22850 7590 09/30/2005

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| EXAMINER |
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CHEN, KIN-CHAN

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| ART UNIT | PAPER NUMBER |
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1765

DATE MAILED: 09/30/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/684,502

Applicant(s)

YAMAGUCHI, TOMOYO

Examiner

Kin-Chan Chen

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 August 2005.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3 and 5-29 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3 and 5-29 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1, 2, 5, and 28 are rejected under 35 U.S.C. 102(a) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Nishizawa (US 6,617,244).

In a method for plasma treatment, Nishizawa (col. 5, lines 58-60; col. 6, lines 53-55; Fig. 2B) teaches that a substrate including a SiC layer and a SiO₂ layer may be arranged in a chamber. An etching gas may be introduced into the chamber. The SiC layer may be plasma etched. The etching gas may include CHF₃. SiO₂ may be a mask

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layer on the SiC layer. The base layer of the SiC layer may be a Cu layer. The etching gas may include nitrogen. Since Nishizawa teaches that "a fluorocarbon" such as CHF_3 may be used to etch SiC (col. 3, line 37; col. 6, line 54). Therefore, it is considered to reads on applicant's "as a main fluorocarbon component thereof".

4. Claims 8, 18, 19, 20, and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishizawa (US 6,617,244).

In a method for plasma treatment, Nishizawa (col. 5, lines 58-60; col. 6, lines 53-55; Fig. 2B) teaches that a substrate including a SiC layer and a SiO_2 layer may be arranged in a chamber. An etching gas may be introduced into the chamber. The SiC layer may be plasma etched. The etching gas may include CHF_3 . The etching gas may include nitrogen. The etching gas may also include the inert gas (e.g., argon). Since Nishizawa teaches that "a fluorocarbon" such as CHF_3 may be used to etch SiC (col. 3, line 37; col. 6, line 54). Therefore, it is considered to reads on applicant's "as a main fluorocarbon component thereof". Nishizawa teaches that in the case of the fluorine compound, when an excess amount of organic polymer is not generated in etching, the mixture of the oxygen gas is not required (col. 6, lines 65-67). Nishizawa discloses that **the fluorine compound may be fluorocarbon such as CHF_3 (col. 3, lines 38-42).** Furthermore, since Nishizawa uses same etching gas (CHF_3) for etching same material (SiC) as instantly claimed, it would result in the same amount of organic polymer generated. Therefore, the oxygen gas is not required in the etching gas as instantly

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claimed because the organic polymer being generated is considered not to be an excess amount.

5. Claims 3, 6, 7, 9-17, and 21-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishizawa (US 6,617,244) as evidenced by Li et al. (US 6,670,278, Nemani et al. (US 6,764,958), Chooi et al. (US 6,284,657) and Demmin (US 6,635,185).

In a method for plasma treatment, Nishizawa (col. 5, lines 58-60; col. 6, lines 53-55; Fig. 2B) teaches that a substrate including a SiC layer and a SiO₂ layer may be arranged in a chamber. An etching gas may be introduced into the chamber. The SiC layer may be plasma etched. The etching gas may include CHF₃. The etching gas may include nitrogen. The etching gas may also include the inert gas (e.g., argon). Since Nishizawa teaches that "a fluorocarbon" such as CHF₃ may be used to etch SiC (col. 3, line 37; col. 6, line 54). Therefore, it is considered to reads on applicant's "as a main fluorocarbon component thereof". Nishizawa teaches that in the case of the fluorine compound, when an excess amount of organic polymer is not generated in etching, the mixture of the oxygen gas is not required (col. 6, lines 65-67). Nishizawa discloses that **the fluorine compound may be fluorocarbon such as CHF₃ (col. 3, lines 38-42).** Furthermore, since Nishizawa uses same etching gas (CHF₃) for etching same material (SiC) as instantly claimed, it would result in the same amount of organic polymer generated. Therefore, the oxygen gas is not required in the etching gas as instantly

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claimed because the organic polymer being generated is considered not to be an excess amount.

Claims 3, 12-14, 17, 21, 24, and 25 disclose various layers structures above or below the SiC layers. They are well-known features and merely choices of design, depending on the product requirement. See Li et al. (US 6,670,278 ; col. 4, lines 63 through col. 5, line 1), Nemani et al. (US 6,764,958; col. 7, line 44 through col. 8, line 59), Chooi et al. (US 6,284,657; col. 7, line 52 through col. 8, line 10) in the record as evidence.

The above-cited claims differ from prior art by specifying various compositions and processing parameters (such as ratios of flow rates of etchants in claims 6, 7, 9-11, 15, and 16). However, same were known to be result effective variables and commonly determined by routine experiment. The process of conducting routine experimentations so as to produce an expected result is obvious to one of ordinary skill in the art. In the absence of showing criticality, it is the examiner's position that a person having ordinary skill in the art at the time of the claimed invention would have found it obvious to modify prior art by performing routine experiments by using various compositions and different processing parameters to obtain optimal result. See Demmin (US 6,635,185) in the record as evidence.

Response to Arguments

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6. Applicant's arguments with respect to claims 1-29 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Demmin (US 6,635,185; Col. 7, lines 5-25) teaches that one skilled in the art of plasma etching and cleaning may vary type of plasma etching (RIE, HDP, plasma etching..), composition, flow rate, temperature, pressure, power, time, bias accordingly to etch a desired material satisfactorily.

Li et al. (US 6,670,278 ; col. 4, lines 63 through col. 5, line 1), Nemani et al. (US 6,764,958; col. 7, line 44 through col. 8, line 59), and Chooi et al. (US 6,284,657; col. 7, line 52 through col. 8, line 10) disclose various layers structures above or below the SiC layers.

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).


A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within

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TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kin-Chan Chen whose telephone number is (571) 272-1461. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on (571) 272-1465. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

September 27, 2005


Kin-Chan Chen
Primary Examiner
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